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AUTOMOTIVE INDUSTRIES

OCTOBER 1992

THE PEOPLE — THE PRODUCT — THE PROCESS

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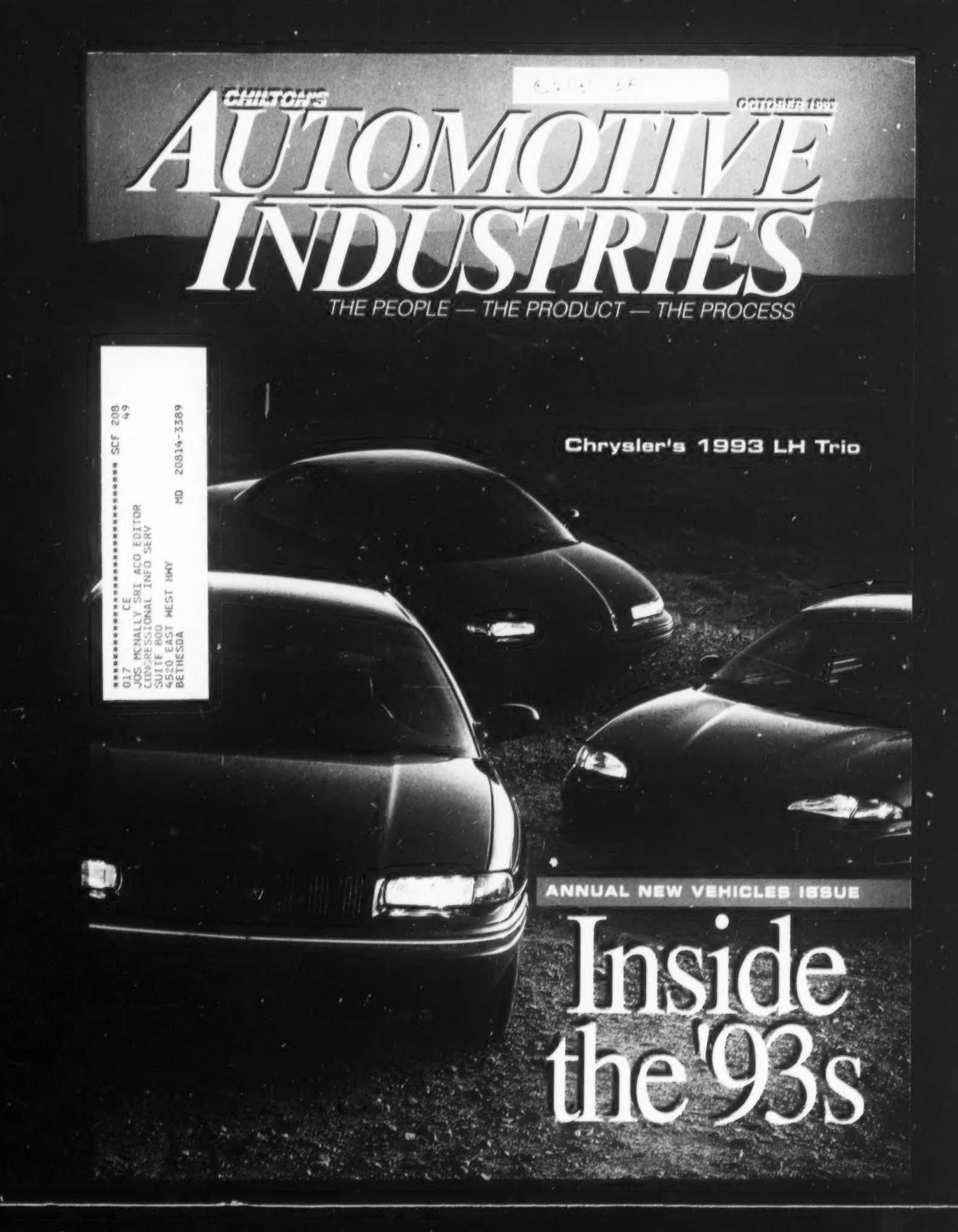

Chrysler's 1993 LH Trio

ANNUAL NEW VEHICLES ISSUE

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ELECTRONICS OUTLOOK: Hot

Demand for automotive semiconductors, relays and 4-wheel ABS skyrockets.

Robust automotive semiconductor purchases have been hammering away at new highs for years, and it's not about to slow down now. In fact, demand for chips will rise sharply for the next two years, says a California-based automotive electronics research team, with a 19% growth rate expected this year and a spectacular 21% leap anticipated next year.

What's more, demand for 4-wheel ABS should climb rapidly through '96, then pancake as the market saturates. The linchpin of the analysis—from a US point of view—is that ABS isn't a Japanese-fueled product. "ABS is a US-driven commodity," says Morris Kindig, president of Tier One in Mountain View, CA. "Those technologies have come out of Delco and Kelsey-Hayes."

In a separate electronics area, long-term downward pressure will not extend to the relay market. Indeed, demand for automotive relays will rise steadily through 1998, primarily due to an increasing number of relays per vehicle.

SHARP GROWTH. Looking back, automotive semiconductor purchases grew from $988 million in calendar year '90 to $1032 million in '91, an increase of 4%, and are expected to grow 19% in '92 to $1225 million. Kindig predicts a 21% growth in '93 will drive the market to $1480 million.

Put simply, in a two-year period the market should rise some 24%. That total excludes captive consumption by GM and a few transplant suppliers, Kindig quickly cautions, but it does include consumption by Motorola AIEG.

GM AND ABS. "You're going to see more and more of it [ABS] incorporated into vehicles, along with traction control," Kindig says. "We're seeing a lot more penetration of that system than we originally anticipated."

Four-wheel ABS rose from 1.5 million units in MY91 to 3.3 million units in MY92, a jump of 120%. "It'll continue rapid growth through [model year] '96 to 10.8 million units, then taper off as the market saturates," he says.

HALL-EFFECT ICS

■ Demand up for traction on ice. Use will rise, initially for engines and transmissions. Later, traction control wheel-speed sensors.

LEDS

■ Stop. LED market doubled each of the last two years, led by center high-mounted stop lights. Other exterior applications include stop lights and turn signals.

■ If and when multiplexed wiring is installed, interior lighting use could sharply expand.

MICROCONTROLLERS

■ Multi-use. Low-cost, add-on ABS designs lean toward single 16-bit micro. That's in place of two micros. Users search for a way to use the micro's power to run other functions when ABS isn't used.

■ Engine control shifts into the 32-bit area. Prime tragets electronic transmission, traction control, cruise control, variable-valve timing and possibly active suspension.

■ If and when multiplexed wiring is implemented, an 8-bit micro will be needed at every node.

SOURCE TIER ONE

MEMORY

■ Flash EEPROMs will supplant EPROMs. EEPROMs simplify production and stocking of engine modules.

■ Small EEPROMs are needed for ABS as they go from 8-bit micros with EEPROM to 16-bit micros without EEPROM.

POWER TRANSISTORS

■ Compact insulated gate bipolar transistor modules will displace early versions of electric vehicle motor controllers with hundreds of power FETs.

■ Delco has shown that its ABS VI using power FETs are the best solution for driving reversing DC motors with high inrush currents. Power dissipation is so low that heat sinking can be eliminated. Power FETs may significantly expand in motor drive applications.

■ Most solenoid drives use power FETs, especially in the engine module and ABS module.

VOLTAGE REGULATORS

■ Surprise. A market for ASIC voltage regulators has developed. Functions separate of voltage regulation are added—a watchdog timer in an ABS circuit.

Out in the field, General Motors leads Ford and Chrysler installation rates by three model years. Saturn jolted into gear first and now sets the standard.

Transplant competitors will increase ABS installations in '93 and '94 limited by their own capacity. Also, sources tell *AI* that Sumitomo reportedly has a new add-on ABS system that is small and inexpensive. Prime candidates for US use are Ford and Mazda.

TRACTION ACTION. Another ABS-related electronic point of light in the waning years of the decade is traction control. Traction control with four-wheel ABS will become increasingly important in '96 and beyond. Most designs can accommodate traction control by the modular addition of two additional solenoids. Latest designs for traction control combine with electronics as an add-on to the ABS, which greatly reduces the cost of interconnection. Also, the electronic module can be easily removed for maintenance without disturbing hydraulics. Old designs had the electronics in a separate box away from the engine compartment.

Traction control is actually being incorporated now, but at very low and somewhat expensive rates. The Chevy Corvette now offers traction control, along with Chrysler's new LH sedan series.

Even the Penske CART racing team is adopting a traction control system—a first in Indy cars.

HALL EFFECT. In a frustrating and sometimes terrifying area of traction control—ice—at least four companies (led by Siemens) have introduced automotive Hall-effect ICs. Present wheel speed sensors are variable-reluctance sensors—wire wound around a magnet. The sensors work great at high speeds, but not that well at very low speeds for traction control on ice. The innovative Hall-effect ICs operate down to zero speed on a twisted pair line and at very low power.

"They've overcome a tremendous number of problems in the development of Hall-effect ICs," says Stuart Harris, Director of Research for Tier One. "In particular, it will operate for short periods of time at 210 C, which is about 60 higher than everyone else even thought of."

RELAY RACE. Meantime, through an aggressive push, automotive relay purchases rose from $137 million in calendar year '90 to $152 million in '91, a jump of 11%. Harris believes that climb will continue to $169 million in '92, with the '93 market resting at a minimum of $180 million.

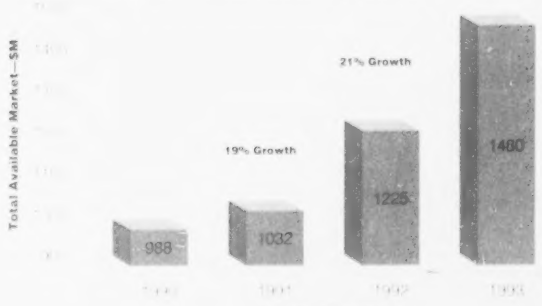
Growth will continue through 1998 because of increasing numbers of relays per vehicle, he adds. OEM accounts for 90% of the market, with the rest split between a rapidly declining replacement market and a fast-growing secondary market of motorcycles, RVs, ATVs and aftermarket.

MINI AND MICRO PLAYS. In the plug-in relay sector, general-purpose relays continue to give ground to mini and micro relays.

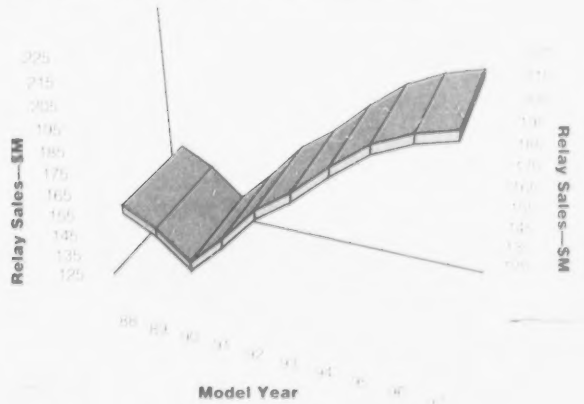
Mini relays generally conform to a European ISO standard. Micro or half-size relays will displace mini relays starting in MY92 in Japan for Honda and in MY94 in the US to isolate passenger-seat airbags.

Special-purpose relays are also declining in use here in the US—both in the OEM and aftermarket—except for the Ford starter relay. *AI*

North American Automotive Semiconductor Market



North American Automotive Relay Market, OEM Plus Aftermarket



North American 4-Wheel ABS Market